ASSESSMENT OF COMPLIANCE OF SAFETY MEASURES ON CONSTRUCTION SITES.

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ABSTRACT

The high increase of accident in construction sites in recent time has necessitated the assessment of the causes, effects and the management of accidents in construction sites in the study area. Problems identified in the study area include; accidents due to slip trip, and falls; ladder accident; fails of material such as tools and equipment; and structure failure. An Area Cluster sampling method was adopted for the identification of new development areas, on the basis of ages of buildings in Iyesi Otta Area of Ado-Ota Local Government Area, Ogun State. Personal observation and interview, through interview guide were used to collect data on accidents in the construction sites, while a structured questionnaire was used to collect data from selected respondents (landlords) on the status of professionals used in the construction of their buildings. Fifty (50) respondents each were selected from the two areas selected, namely; the Oriade Area and the Adebisi Area, making a total of one hundred (100) respondents. Seventy-nine (79) respondents representing 79% employed nonprofessionals in the construction of their buildings, twelve (12) respondents representing 12%, employed professionals, while the remaining nine 9 respondents, representing 9% were uncertain of the status of professionals used in the construction of their buildings. Slip, trip and falls has the highest frequency of accidents with eighty – two (82) respondents identifying this type of accident as the most occurrence among the accidents in the construction site in the study area. Data collected revealed that no measure were on ground in the case of accident. Recommendations made include the enforcement of the use of professionals in construction works, review of safety measures, and public enlightenment on construction regulations and safety measures.

Keywords: Accident, Construction, Enforcement, Management, Safety measures

INTRODUCTION

The construction industry is one of the industries that contribute to the increasing rate of the gross domestic production in Nigerian economy and it is vital to the achievement of the socio – economic development goals of providing shelter, infrastructure and employment. Mwombeki (2005) viewed accident as an unpleasant and unexpected occurrence, which upsets a planned sequence of work, resulting to loss of production, injury, harm and death, damages to plants and equipment and interrupting production flow. The construction industry has one of the worst injury experience record among the industries and these records have been maintained for a long period of time.

International Labour Office, (I.L.O) (2005) shows that occurrence of strip, slip and trip, major fall from height, electrical hazard, and impact hazard and so on are the major causes of accident. Accidents in building construction site has direct consequence on the entire project, these consequence may include but not limited to loss of money, loss of working hours, loss of security confidence, partial or permanent disability and possibly death.

It is on this premise that the research is on the investigation of the causes of accidents in construction sites, the effects of the accidents on both the people and the environment, and the assessment of accidents management techniques and measures adopted. Adebisi and Oriade Areas of Iyesi -Otta were understudied for this research. It is important to note that these two areas are areas with new development (construction) taking place significantly. Data on the occurrence of accidents (by type) in construction sites in the study area, use of professionals in the construction of buildings, and the assessment of safety measures are germane to this research in order to make necessary recommendations.

PROBLEM DEFINITION

Fall of person from scaffold and collapse of scaffolds has constantly been the number one killer in Hong-Kong construction industry (I.L.O (2005)), and that 4,500 injuries and 50 fatalities from 2.3 million construction workers annually can be prevented with proper erection and use of scaffolds. However, Mwombeki (2005) identified factors associated with mobile cranes failure include support failure, failure to use outriggers, crane failure or collapses and rigging failure, and posit that that significant and serious injuries of fatality may occur if cranes are not inspected before use and if they are not used properly.

Collapse of building during construction work on site is one of the problems identified in the study area. However, this phenomenon is as a result of many factors, such as; poor construction material; use of nonprofessional in the construction of buildings; lack of construction safety measures and so on. Another problem associated with poor safety measures in construction site is the employment of quacks in the construction works. The quacks are not knowledgeable of the safety measures in construction works, and therefore carryout their activities, which when result into accident leads to a fatal occurrence.

Another problem identified is the noncompliance to construction safety measures during construction works on site by the professionals. It is observed that the safety materials and equipment needed to be on site during construction works are not provided.

Non Approval of Plan before construction work is another problem identified in the study area. it is important to note that the status of buildings,(with respect to approval) determines whether the building is to be constructed or not.

LITERATURE REVIEW

According to Lubega (2001) the important characteristics of every construction project are the cost, duration, quality and safety of such project, and that there has been a greater emphasis on the first three aspects at the expense of safety. A lots of people have been exposed to risk situation on building sites, resulting in a high occurrence of accidents due to lack of adherence or inadequate provision of safety requirements. However Gangwar and Goodrum (2005) mention that control of accidents on any building site is not the responsibility of just one person but to everyone that participate in the production of such project on site.

Construction sites are known for high rate of occupational accidents, which present the field as one of the most dangerous workplace on earth (I.L.O., 2005). Lubega (2001), observed that the occurrence of accident differs from one site to another and that strip and trip, major fall from heights, electrical accidents; impact hazards and so on are the major causes of accidents or most occurred type of accidents on any building sites.

Mwombeki (2005) posit that acts of God or disasters as related to construction are events or actions, which causes severe damages to construction products, processes and stakeholders.

Various acts of God that cause casualties on sites are rain, flooding, wind, lightning, earthquakes, land sliding, etc. However, their occurrences are not frequent, but once they occur, the consequences are always high and disrupt activities of construction enterprises. Mwombeki (2005) further state that the effect of the acts of God or disaster to constructed items or items under construction has a huge direct impact on human lives, society and the economy.

Adeniye (2001) states that during the rainy season, many materials are wasted and manpower is lost on building sites while Sotire (1992) points out that since construction workers work on an unsheltered environment, adverse weather conditions should be avoided because continuous exposure to adverse weather could lead to general discomfort and illness.

Continuous exposure to moderately high noise level or relatively high level of impulse noise such as explosives on site, noise produced by heavy equipment, noise from carpentry works, welding works and aluminum works on site are the major causes of occupational deafness (Adeniye, 2001). Thus, continual exposure to this high level of noise produced on site could risk a site worker to future or occupational deafness or hearing problem; if effective control such as earplug is not provided and used. Therefore, noise on sites must be maintained at a bearable level or a noise protection provided.

Sotire (1992) viewed that in the construction industry, many professionals are involved in the execution of particular projects, and this professional carries out their work according to their own area of discipline. He observed that many accidents have been recorded due to professional incompetence, while Mwombeki (2005) enumerates four preventive approaches for accident, namely; Safety Plans; Safety Training and Meeting; First Aid and Medical Arrangement and Management Policy.

Management of any construction firm has the responsibility of developing a comprehensive and written safety programme that is performance oriented. The information should include the basics of personal protective equipment, the proper use of tools and power equipment, safe work practice, company policy on safety, safety responsibilities, emergency procedure, and so on. This document must be made available to every worker on site and adherent to it must not be compromised. The responsibility of the safety personnel shall be to draw up a safety plan, setting out the rules applicable to the construction or building site, and shall make any adjustment to the plan, ensure effective distribution and use of safety equipment. However, safety training is an essential part of

any safety and health programmed. This training should be provided in the language well understood by the workers (Hassanein and Hanna, 2007)

The type of management policy or commitment to safety at workplace is very essential to the prevention of accidents. The various commitment of construction management are in drawing up of an effective safety plans, provision of protective equipment's for all site workers and personnel, encourage safe working habits, incentives for safety and regular review of accident prevention or safety programmes.

In the same vain, Health and Safety Executive (H.S.E.) (2007) and Occupational Safety and Health Administration (O.S.H.A.) (2005) outline preventive measures as; Wearing clothes that are appropriate to the work and weather condition on site; Wearing of hand gloves; Wearing of work traction boots at all times on site; Wearing of hardhats or helmet at anywhere on site; Provision of eyewear or goggle for welding purposes and so on; Constant inspection and assessment of equipment, plants, tools and other site materials before use; Organizing effective safety training for all site workers and personnel whether on site or off site; Provision of effective first aid facility and personnel on site; and Provision of barriers, signs or reflector around dangerous areas on site (for example, barrier around trench and so on)

CONCEPTUAL FRAMEWORK

Concept of Construction Sites Accidents

Types of Accident

Below are some of the accidents that are usually encountered on construction site.

- Scaffold accident and Accident on the roof
- Accident due to slip, trip and falls
- Crane accident
- Ladder accident
- Electrocution
- Fails of material such as tools and equipment
- Construction vehicle accident
- Trench collapses
- Fire and explosion in construction site
- Structure failure on construction site
- Building collapse on construction site
- Flooding accident
- Transport

Scaffold Accidents.

Fall of person from scaffold and collapse of scaffolds are major accidents in the construction sites. Fatal accident arising from bamboo scaffold and working on platform are identified as accidents leading to death if adequate safety measures are not in place.

Figure 1

Crane Accident

Factors associated with mobile cranes failure include support failure, failure to use outriggers, crane failure or collapses and rigging failure. Though, the collapse of tower cranes is rare, accidents and near misses do occur. Failure of any part of the crane or load carry systems are likely to cause serious accidents, with both crane operators, site personnel and general public involved. Often, these injuries occur when a worker is struck by an overhead load or caught within the crane's swing radius. It therefore implies that, crane accidents are associated with erection or assembling, usage, dismantling and supervision or inspection and are major treat to life of workers on any building site.

Figure 2

Construction Vehicle Accident

Large construction equipment (for example. cranes, forklift, dump trucks, road graders and concrete mixtures and so on.) may become potential dangers on a construction site due to their weight and size, workers and drivers can be seriously injured or killed in an accident. In some cases, drivers may not have competent driving skills, or other visibility may be limited due to site constraint.

Figure 3

Trench Collapse

The building of trenches is necessary for many construction tasks. They are present wherever buried utilities are constructed or repaired. A trench is narrow in length with its depth greater than its width. When trenches are constructed they must have safety guards in place to protect workers inside the trench from collapse. When a trench collapse workers may easily become crushed under the weight of heavy soil from above one cubic yard of soil weighs about as much as a midsized automobile, and suffocation can occur with only a couple feet of soil on top of the victim.

Figure 4

Fires and Explosion in Construction Site

Fires and Explosions kills many and injure thousands of workers each year. For these reasons, special safety guidelines has to be established to prevent construction accidents arising from fires and explosion.

Figure 5

Source: field survey showing Fire Accident.

Structure Failure on Construction

By definition, a structure failure take place when a building or other structure breaks in such a way that it cannot carry a great load as it could before failure. Structure failure can be catastrophic and result in major injury and loss of life.

Figure 6

Source: field survey showing Structure Accident

Building Collapse on Construction Site

Building collapse can be caused by bad design, faulty construction, foundation failure, extraordinary loads, unexpected failure, or any other combination of these causes. Construction workers worst nightmares are realize if he or she is in a building during its collapse. Victims may be injured, crushed or killed as debris and materials fall down around them.

Figure 7

Source: field survey showing Building Collapse.

Flooding Accident

In site where drainage system were not properly laid, there is the tendency that the site may get flood during raining season. Excavation work in this area passes great danger as worker digging may get drown or carried away if the spread of flood is much. This can also lead to a worker injuring himself with his working materials due to the effect of the flood. The flood can also cause injury on the workers when carried with its harmful materials. Akhmad and Duff (1998).

Figure 8

RESEARCH METHODOLOGY

The research adopted an Area Cluster sampling method, in which the emerging areas of significant development were identified. Two (2) areas were selected in Iyesi Otta, Ogun State, namely; Oriade and Adebisi. Iyesi Otta is a major urban town in Ado Odo Otta Local Government Area of Ogun State. Iyesi Otta is a major fast growing settlement in the Local Government Area, with major landuses such as public uses and commercial uses.

A total of three hundred and fifteen (315) buildings were in existence in Adebisi Area, with two hundred and sixty eight (268), representing 85% of the total number of buildings less than 15 years of age, while a total of two hundred and sixty-four (264) buildings were in existence in Oriade Area, with two hundred and thirty eight (238), representing 90% of the total number of buildings less than 15 years.

Fifty (50) landlords were selected as respondents randomly in each area, and this makes a total of one hundred (100) respondents. Out of forty seven (47) buildings under construction in Oriade and eighteen (18) buildings under construction in Adebisi, 50% of buildings under construction in each identified area were selected in order to assess the management techniques adopted in the construction of buildings. Hence, twenty-four (24) buildings under construction in Oriade and nine (9) buildings under construction in Adebisi, were sampled. A check list was prepared and used to take inventory of preventive equipment on each of the site sampled. Descriptive was adopted in the analysis of data collected.

DATA PRESENTATION AND ANALYSIS

Data on the status of workers used in the construction of buildings in the study area was collected, while the types and frequencies of accidents in construction sites were collected. It is important to note that the total number of buildings in the two identified area of Iyesi Otta, in Ado – Odo Otta Local Government Area, Ogun State was collected through direct observation, (by counting).

The analysis of total number of buildings in the identified areas and the number of buildings less than 15 years, are presented in table 1

Table 1: Total Number of Buildings and Buildings Less than 15 years in the Study Area

Area	Total No of Buildings	Total No of Buildings less than 15 years	Percentage
Adebisi	315	268	85
Oriade	264	238	90
Total	579	506	87

Researchers' Field Survey (August 2019)

The data in table 1 revealed that buildings less than 15 years have the highest frequency, when compared to other buildings ages. This data has clearly shown that the areas selected are developing area which have expressed urbanization from the perspective of population increase and high housing demand. Developing areas are used to capture the compliance of building laws, regulations and measures in the building industry in order the assess the present levels of compliance by the various stakeholders in the industry, in which compliance to safety measures in construction sites is included.

However, the research identified the status of workers in the construction sites to be an important aspect of assessing safety measure compliance in construction sites. Base on this, data on the professional status of workers who engaged in construction of buildings in the study area was collected and presented in table 2

Table 2: Professional Status of Construction Workers in the Study Area

Area	Building Professional	Non Professional	Uncertain of professional status	
Adebisi	3	42	5	50
Oriade	9	37	4	50
Total	12 (12%)	79 (79%)	9 (9%)	100

Researchers' Field survey (2019)

The analysis of table 2 shows that 79% of the landlords employed nonprofessionals in the construction of their buildings, while 12% of the landlords employed professionals in the building industry in the construction of their buildings. However, 9% of the landlords are uncertain of the status of professionals employed in the construction of their buildings.

From the analysis, it is revealed that 79% of construction workers have no idea of safety measures in construction, while the 9% of the uncertain status of professionals implies probability of compliance to the safety measures in construction activities in the study area.

However, 79% of nonprofessional status of construction workers is significant, and points to high level of noncompliance to building regulations, and safety measures.

Slip, trip and falls has 83% of the accident occurrences in building construction in the study area, while 17% accident in building construction were the failure of material such as tools and equipment.

The analysis of preventive equipment on sites in the study area is presented in table 3.

Table 3: Preventive Equipment on Sites in the Study Area

Area	Const. Clothe	Protective Hand Gloves	Work Traction Boots	Hard Hat	Face Shield / Safety Glasses	Nose Guard	Earing Protect. Wear	First Aid Box
Adebisi	2 (22%)	4 (44%)	2 (22%)	0	0	0	3 (33%)	0
Oriade	1 (4%)	13 (54%)	3 (13%)	0	2 (8%)	0	5 (21%)	0
Total	3 (9%)	17 (52%)	5 (15%)	0	2 (6%)	0	8 (24%)	0

Researchers' Field survey (2019)

The analysis in table 3 revealed that Hard Hat, Nose Guard and First Aid Box were not available on sites in the study area. The Protective Hand Gloves have the highest frequency of equipment available on sites, with 52% while face shield/ safety glass has the lowest frequency of the preventive equipment on sites in the study area, with 6%.

An overall analysis of table 3 revealed a very low frequency of preventive equipment on sites in the study area, and this implies that the level of safety measures in construction works in the study area is significantly low.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Accidents on construction sites are caused by a wide range of factors, some of which are: lack of awareness of safety regulations; lack of enforcement of safety regulations; poor regard for safety by people involved in construction projects; engaging incompetent personnel; mechanical

failure of construction machinery/equipment; and physical and emotional stress. The accidents due to slip trip, and falls; ladder accident; fails of material such as tools and equipment; and structure failure are the problems identified in the study area. The overall analysis of table 3 has revealed that safety measures in construction sites in the study area is low, and therefore it is concluded that the accident management on construction sites in the study area is poor, hence, the recommendations stated in this research are to improve and ensure the sustenance of appropriate accidents management on construction sites in the study area.

Recommendations

The following recommendations are made:

(i) Review existing safety regulations;

(ii) Enforce building and safety regulations;

(iii) Sensitizes the professionals, and sensitize, educate and train the public;

(iv) Engagement of competent personnel and ensure close site supervision;

(v) Promote professionalism and ensure compliance with the professional code of ethics;

(vi) Undertaking of insurance covers and consider health and safety at all stages of project implementation; and

(vii) Maintenance and regularly servicing of tools, plant and equipment.

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